Engineering Library

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • JANUARY 22, 1942 • VOLUME 128 • NUMBER 4

FWA will pool personnel to expedite housing program

Baird Snyder, deputy to the administrator, is made responsible for housing jobs, which will be handled as FWA staff assignments instead of as USHA or PBA projects

Final Congressional action on amendments to the Lanham Defense Housing Act leaves the Federal Works Administrator a free hand in allocating housing projects among his various agencies. And reorganization of the setup for building permanent defense houses is now in full swing. Organization of the demountable house program got underway a week ago (*ENR*, Jan. 15, p. 75).

FWA Administrator Fleming has turned over the immediate responsibility for the housing and defense public works programs to his deputy, Baird Snyder. Snyder is a graduate engineer, practiced engineering and later was a construction contractor until he joined the government service as associate and then chief engineer in the Farm Security Administration. Just before coming to FWA he was deputy to Fleming in the Wage-Hour Administration.

Snyder wants to treat the housing program as a Federal Works Agency job rather than a USHA job or PBA job. He wants to get away from the idea that the various agencies in FWA are entitled to certain housing jobs by rights.

Technical personnel from FWA.

To accomplish this objective, the FWA agencies are to be treated—for defense housing purposes—simply as a pool of technical personnel. When a housing job in a particular community comes along it will not be assigned to an agency. It will be assigned to a man, perhaps in PBA, perhaps in a USHA regional office, or perhaps on the FWA staff. He will have to get together a staff, mostly but not necessarily, from the people he's been working with right along. In some cases, a single project might cut across agency lines—involving a site planner from USHA, a designer from PBA, a lawyer from FWA, or the like.

And when a job is thus turned over, by memorandum, to a particular individual, he will be responsible as regards that job to Snyder rather than to the commissioner of public buildings or the USHA administrator.

Defense public works is not to be merged with the housing job. But wherever, in any community, close coordination is needed between the housing job and provision of utilities or schools, a DPW man will be assigned to work with the man handling the housing job.

Although access roads frequently are required in the same areas that need housing and public works, no close connection is seen between the jobs, and Public Roads Administration procedure will not be affected by the current reorganization.

An incidental advantage of this loose set-up is that it will not interfere with an overall reorganization of government housing that the President may put into effect. Some months ago, the President commissioned Judge Rosenman, his adviser on government reorganization, to study the whole housing picture. Rosenman is still working on the matter, is understood to have in mind the creation of a single agency to handle all permanent war housing and which could become a public housing agency after the war.

Considerable simplification of the engineering and architectural phase of the housing program is intended. FWA technicians are now reviewing all the house designs that have been used in the program to date and will select from them some thirty or forty standard designs to which future projects will be restricted.

Design work at the site—grading, utilities, placement of houses and choice of house designs—will be done by outside architects and engineers retained for the purpose. On each project an architect-engineer team will be retained and will be responsible for inspection of construction as well as for design. They will have very full authority over the job, except that a government man will sign the actual estimates.

It is intended to decentralize as much as possible the retainer of engineers and the employment of contractors. The machinery is not yet fully set up, but probably the men in the field will be given full authority to sign contracts. Most construction contracts will be awarded by negotiation, since it is felt that under present conditions competitive firm price contracts are likely to be too high.

• • •

Billion and a half asked for war construction

The President's request to Congress this week for $28,500,000,000 of new war money includes something like a billion and a half for construction. Largest and most uncertain amount consists of part of the $933,000,000 asked for expansion of armament production facilities. Much of this money will be used for machinery but some will unquestionably go for construction of new factory buildings.

For Naval public works, $331,000,000 is asked, including $25,000,000 for a program of ammunition storage and $6,333,000 for a flight test center at Cedar Point, Md. Also asked is $250,000,000 for new ship repair facilities.

No request is included for money to carry out the new cantonment program or other expenses arising from the pending increase in the size of the Army.

• • •

Douglas Dam opposition now eliminated

The President has asked Congress to give TVA $30,000,000 for an immediate start on construction of Douglas Dam on the French Broad River. This project, which has been urged by OPM as the quickest way to provide power for war needs, has been before Congress previously but was defeated as a result of the opposition of Senator McKellar of Tennessee. The Senator, it is understood, has now withdrawn his opposition to the project.

When it rejected Douglas, Congress approved two other projects—the Watauga and South Holston Dams—instead, the work on these is now underway.

California schools rated for air raid safety

School authorities in California have been given definite information by the state Department of Public Works to enable them to classify their school buildings and to rate their relative safety under air attack. The classification is of two types—as to hazard of area and as to safety of the building. Four areas, from hazardous to safe, are listed, and all buildings are divided into three groups. The following excerpts from a memorandum prepared by D. C. Willett, supervising structural engineer, and distributed by Anson Boyd, state architect, gives the details.

Classification of buildings as to safety

Group 1: Buildings which are very hazardous and which intensify the dangers from aerial attack.

(a) Masonry buildings with no lateral force resisting elements. Their possible collapse would increase the hazard from aerial attack.
(b) Buildings which are so arranged that there is no section which will afford protection from flying glass splinters and bomb fragments. Buildings with classrooms arranged on one side of open or glassed-in corridors, without basements, are of this type.

Group 2: Buildings which afford some protection.

(a) Buildings which will provide a place of refuge from glass splinters. A frame building with interior corridors would belong in this group.
(b) Buildings which will provide safety from glass and bomb fragments but which are subject to damage from incendiary bombs and anti-aircraft shell fragments. Well-built masonry buildings with wood floors and wood roofs are examples of this type.

Group 3: Buildings which, with minor alterations, have areas which are reasonably safe (except from direct hits).

(a) Well-constructed fireproof buildings with interior corridors (corridor walls of masonry) or basements which may be made reasonably safe from glass splinters and which will resist bomb fragments, belong in this group. Protection may be provided in corridors by the removal or protection of glass in transoms, windows, doors and skylights, and by the provision of adequate baffles at exposed corridor ends.

Classification of areas as to hazard:

Area 1: Areas near military objectives.

Areas in the vicinity of vital military establishments or vital war industries, are likely to receive some of the bombs aimed at the important target. In addition, such areas would be liable to receive fragments from anti-aircraft shells and aerial combat.

Area 2: Densely built-up coastal cities.

These areas form an attractive target for aerial attack but are less hazardous than areas in Area 1.

Area 3: Suburban areas and interior cities.

Where buildings cover only a small percentage of the ground and interior cities without vital military establishments or war industries are not very satisfactory targets for high-explosive shells, but due to the combustible nature of the buildings usual in such areas, they might be good targets for incendiary bombs.

Area 4: Rural areas thinly populated.

Such areas which present no worthwhile targets would rarely be attacked by enemy planes.

Mr. Boyd points out in the memorandum that experience in England and Spain indicates that structures designed to resist lateral forces have shown superior resistance to all sorts of bomb effects, a fact that should give encouragement to those districts having earthquake-resistant buildings constructed during the last nine years under the supervision of the division of architecture. However, while not subject to collapse, even well designed buildings afford no refuge from the hazards of bomb fragmentation and glass splinters.

The memorandum also warns school authorities against a feeling of false security just because a proposed refuge is surrounded by blank walls. All such refuge locations should be examined by engineers who are competent to appraise conditions.

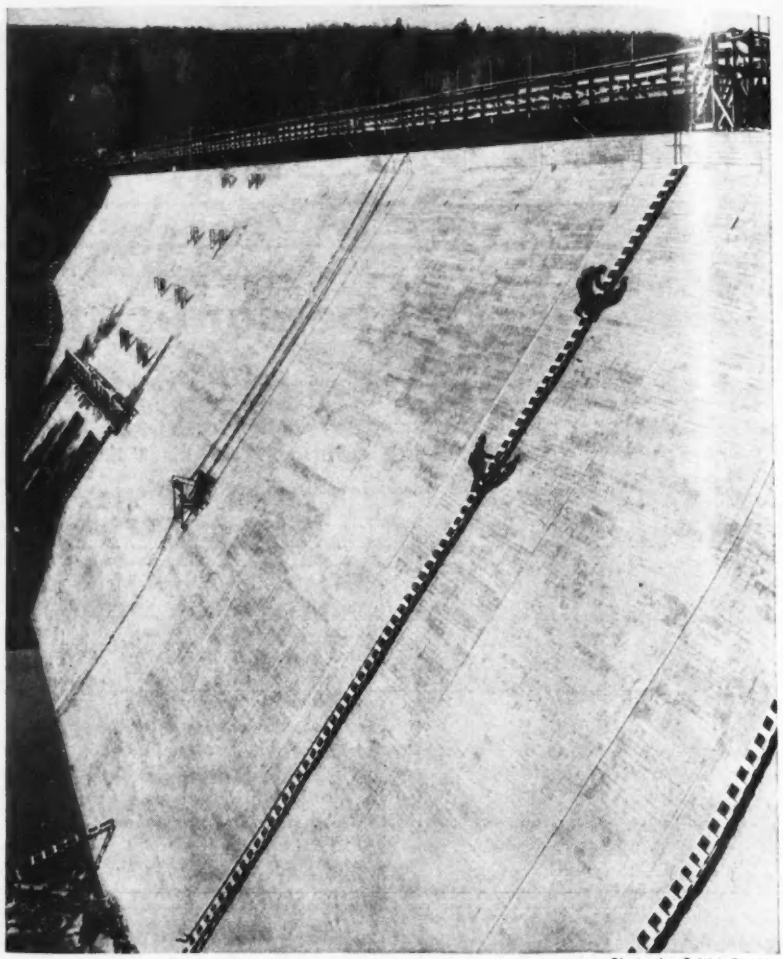


Photo by British-Combine

More power for Eastern Ontario

Nearing completion on the Madawaska River in the eastern part of the province of Ontario is the Barrett Chute power project where 54,000 hp. will be developed in two units under a head of 150 ft. The new dam, open canal, penstocks and power plant form one unit of a group of projects being built by the Hydro-Electric Power Commission of Ontario for the full development of the power resources of the Madawaska River, a tributary of the Ottawa River. The work is being done by the construction division of the hydro-electric Commission.

Also under construction at the headwaters of the Madawaska is a rolled-earth dam at the outlet of Bark Lake, 65 miles above Barrett Chute, to impound 300,000 acre-ft. of water. That structure is being built by the Dominion Construction Corp. of Toronto for the commission. Thomas H. Hogg is chairman and chief engineer of the commission, and Otto Holden is chief hydraulic engineer.

Engineering News-Record is published every Thursday by McGraw-Hill Publishing Company, Inc., at 99-129 North Broadway, Albany, N. Y. Editorial and business offices 330 West 42nd St., New York, N. Y. Subscription, domestic, Canada, $5.50 for one year, $9.00 for two years, $11.00 for three years, Mexico, Central and South American countries $5 for one year, $8 for two years, $10 for three years. Great Britain and British Possessions 54 shillings for one year, 108 shillings for three years. All other countries $9 for one year, $18 for three years. Entered as second class matter October 29, 1936, at the Post Office at Albany, N. Y., under the act of March 3, 1879. Printed in U. S. A. Cable Address "McGrawhill New York." Member A.B.P. Member A.B.C. Copyright 1942 by McGraw-Hill Publishing Co., Inc., James H. McGraw, Founder and Honorary Chairman; James H. McGraw, Jr., President; Howard Ehrlich, Executive Vice-President; Mason Britton, Vice-Chairman; B. R. Putnam, Treasurer; D. C. McGraw, Secretary; J. E. Blackburn, Jr., Circulation Manager.

Billion dollar army camp expansion calls for temporary type construction

New cantonment program necessitated by doubling of army will be handled by Corps of Engineers through division and district offices

Half a billion to a billion dollars worth of cantonment construction will be required to house the doubled army contemplated by the War Department, it is estimated in Washington. The present army of about 1,700,000 men is to be expanded this year, the Secretary of War announced last week, to a strength of 3,600,000.

No official figures are yet available as to the housing that will be required for this additional 1,900,000 men. The cantonment building program of 1940-41 cost roughly a billion dollars to house some 1,200,000 men, or a little under a thousand dollars a man. Several factors are operating however to cut down the total figure which analogy with the previous program would seem to indicate. For one thing an indeterminate number of men will be sent overseas to combat areas and will require no fixed cantonments except such as are constructed by troops themselves.

Even for those men who must be housed in the continental United States, the construction involved should be less costly than that involved in the last program. The most expensive work—specialized schools, reception centers, and the like—was taken care of in the previous program. There will be some expansion of such facilities, but the bulk of the load can be handled by shortening training periods and moving the men through faster.

Thus, the bulk of the job is provision of bare shelter. And even this will be of a cheaper and more temporary type. "Theater of operations" type housing is to be used instead of the substantial wooden barracks built to date. This means either tents or rough shacks which can be thrown together in a few hours—without much plumbing inside and heated by portable stoves.

Little has been said about locations. The Secretary pointed out that nine standard 30,000-man cantonments are now under construction, and said that five new temporary tent camps are planned. Bulk of the new capacity, apparently, will be obtained by expansion at present sites.

In accordance with the recent reorganization of War Department construction, the new cantonment program will be handled by the construction division of the Corps of Engineers through the division and district offices. Under a recent ruling of the Under-Secretary of War and the Chief of Engineers, contracts up to $5,000,000—either negotiated or competitive—will be awarded in the field. Division engineers have authority over awards up to $5,000,000, district engineers up to $2,000,000. Larger contracts must be cleared through Washington.

• • •

PRA approves $3,000,000 Maryland defense highway

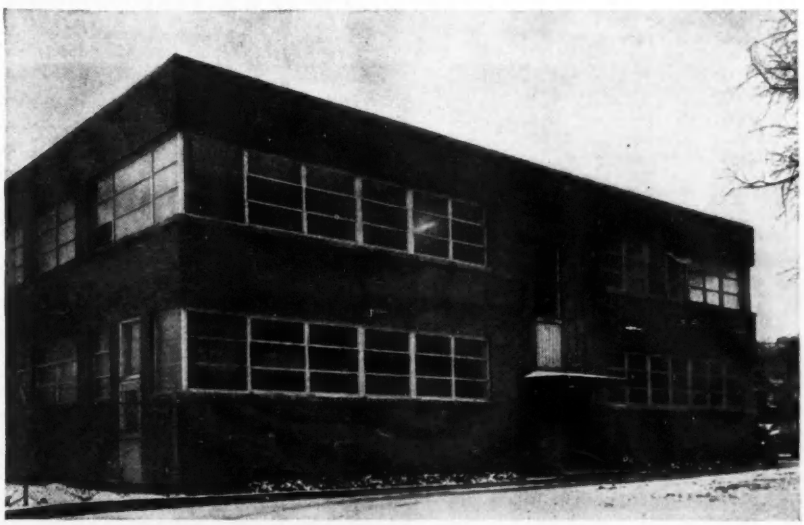
Final approval by the Public Roads Administration for a $3,000,000 dual lane defense highway has been granted the Maryland State Roads Commission. Known as the North Point Road, the project has been designed primarily to facilitate the flow of traffic to and from the Sparrows Point mills and shipyards of the Bethlehem Steel Co. Plans call for construction of two cloverleaf grade separations to be built at a cost of about $500,000 each.

James C. Stewart dies; was noted contractor

James C. Stewart, retired president of James Stewart & Co., well-known contracting firm, died Jan. 10 after an illness of ten days at his home in New York City. He was 81 years old, and during his life supervised many notable construction jobs throughout the United States and abroad. He was particularly active in Great Britain.

Among outstanding projects completed under the direction of Mr. Stewart were the Galveston waterfront rebuilding after the disastrous flood of 1900, the Westinghouse plant at Manchester, England, the tunnel under the Mersey River at Liverpool, and parts of the London underground railway system. Also the New York Central office building, the 60 Wall Tower building, New York City; and buildings for the Interstate Commerce Commission, the Department of Labor and other Federal departments at Washington, D. C.

Mr. Stewart withdrew from active association with his firm in 1940, but continued as Chairman of the Board and as a consultant.



Standard Oil laboratory at Western Reserve

The Standard Oil Co. of Ohio, late last month, completed a two-story research laboratory adjacent to the Western Reserve University campus in Cleveland, Ohio. The laboratory is located at Western Reserve University as a means of promoting the interchange of manpower and facilities under a long range program for cooperation between industry and educational institutions.

Five separate laboratories, a large engine testing room and cold room, provided in the building, combine practically every known facility for the development of higher octane gasolines, diesel oils and other fuels; of new lubricating oils and greases; of better asphalt products, and new by-products of the refining process. The building contains 14,000 sq.ft. of floor space.

An elaborate ventilating system, specially designed to meet the requirements for control of conditions in the laboratories and engine testing rooms, delivers filtered air throughout the building, insuring a complete change of air every six minutes. The contract was held by the Bison Co., of Cleveland and the building was erected at a cost of $75,000.

California issues rules for air raid shelters

An appendix to the state building code has been issued by the California Department of Public Works, division of architecture, to cover the requirements for rair raid shelters. As one of the first formal specifications on a type of structure that has suddenly assumed universal importance, "Appendix A, preliminary draft of Article 13," as it is called, is quoted below in full:

General

The following regulations are based on providing protection from bombs which are not direct hits, but which fall close. These requirements are intended to provide protection from glass splinters, bomb fragments, anti-aircraft shell fragments, and miscellaneous debris, but are not intended to supplant other provisions of these Rules and Regulations.

Lateral protection

Air-raid shelters shall have a minimum thickness of material on all sides as listed below.

Materials	Exterior Walls In.	Interior Walls In.
Tamped earth with structural support..	40	27
Sand in bags between two layers of wood sheathing	30	20
Unreinforced brick masonry, lime - cement mortar.....	17	13
Reinforced brick masonry, cement mortar	13	9
Unreinforced concrete	15	12
Reinforced concrete..	12	8
Timber	20	14
Steel plates	1½	1

or by a proportionate combination of the above materials. Walls below ground, which are backfilled, need only be designed and constructed to safely retain the earth.

Overhead protection

Provisions shall be made to afford protection from falling loads due to the collapse of any structure over or within one-half its height from the shelter, based on an estimated static loading as representing the effect of impact. Where such possible falling loads do not include heavy machinery, materials of abnormal weight, nor such construction as tanks, chimneys, etc., the following estimated weights will be used as the minimum static load (in addition to the usual design floor loads) to represent the effect of falling debris:

a. Brick bearing wall buildings having 1 or 2 stories above the top of the shelter, 200 lb. per sq. ft.; 3 or 4 stories above, 300 lb. per sq. ft.; and more than 4 stairs above the top of the shelter, 400 lb. per sq. ft.

b. Buildings with a complete reinforced concrete or structural steel frame, 200 lb. per sq. ft.

c. One- or two-story wood frame buildings, 100 lb. per sq. ft.

Where falling debris may include heavy machinery, water tanks, etc., a special study shall be made of each situation and equivalent loads estimated. In any case the thickness of the overhead protection shall be not less than as given in the following table.

Materials	Thickness In.
Steel	¼
Reinforced concrete	4
Brick arches	9
Broken stone or earth.....	18
Timber (if protected by earth)	10

Capacity

Air-raid shelters shall have not less than 6 sq. ft. of floor area, nor less than 50 cu. ft. of air space for every person accommodated.

Numbers of persons per shelter unit

No compartment of a shelter shall be occupied by more than 50 persons. The dividing walls between compartments shall be as required for exterior walls. Preferably the compartments of a shelter should be separated as far as possible.

Exits

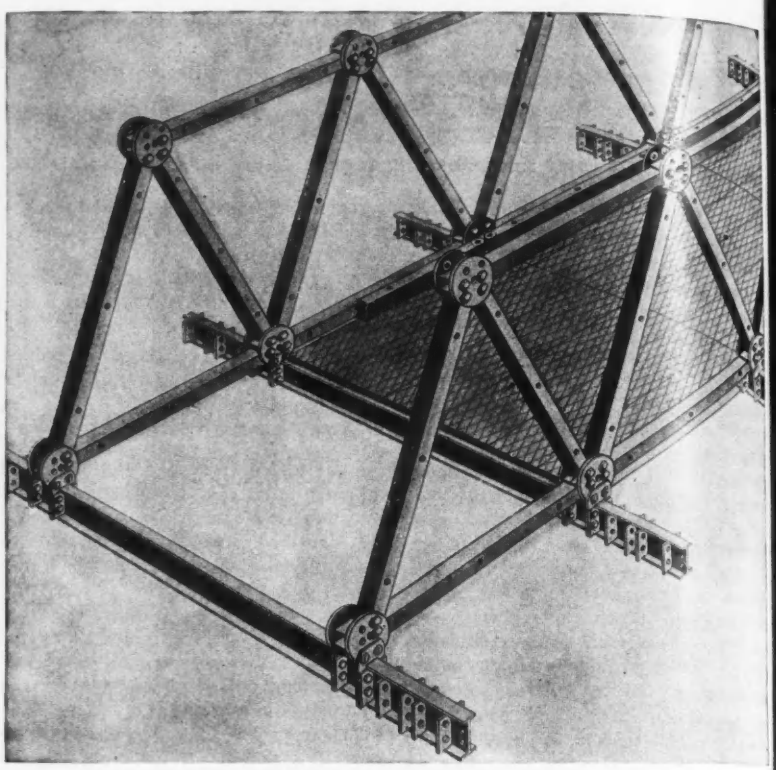
Each compartment shall have two means of egress as widely separated as possible. One exit may be of an emergency type.

Sanitary facilities

Sanitary facilities, or access thereto, shall be provided for all air-raid shelters. Such facilities shall comply with all state and local regulations applying thereto.

Gas protection

Provision shall be made for future installation of anti-gas protection.



British bridges assembled from five standard parts

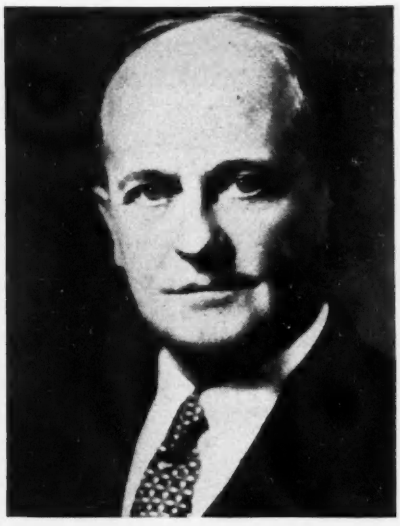
Steel bridges in spans from 60 to 150 ft. and in capacities ranging from pedestrian to highway loads can be assembled from five standard parts developed by The Butterley Co., Ltd., an engineering firm in London. As shown in the accompanying illustration the parts consist of (1) a chord and diagonal member, (2) a circular gusset plate, (3) a floorbeam, (4) a hanger plate which attaches the floorbeam to the gusset, and (5) a checker plate floor in units 10 ft. long and 2 ft. wide.

Assembly of this special bridge is by 2-in. dia. turned pins threaded for a nut. The chord and diagonal members are welded, of ¼-in. plate, and are 8x6-in. in section by 9 ft. 4 in. long. The gussets are 23 in. in dia., while the floorbeams are 15x6-in. I's, 20 ft. long, and weigh 45 lb. per ft.

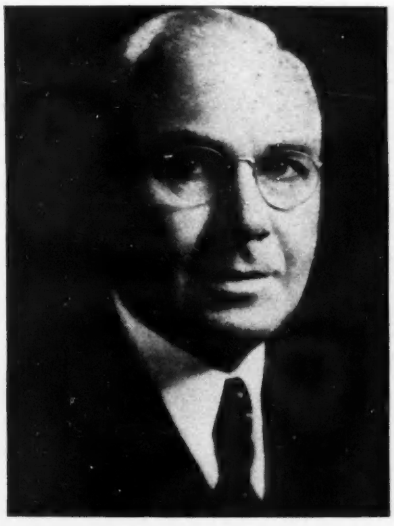
The illustration shows the lightest construction. To increase the capacity, additional sets of chords and diagonals are added to the floorbeam extensions. Finally, for the heaviest type of span, the truss depth is doubled, giving a double intersection panel system; in this case the floor would be at mid-depth.

The bridges are planned for temporary service to replace structures destroyed by bombing, or, in peacetime, by floods, etc. Erection requires no falsework, enough bays being assembled on land to serve as a counterweight for cantilever erection; after which the whole span is slid forward to the opposite abutment.

Ralph Budd's *interest in railroading, fostered by men like John F. Stevens and James J. Hill, took him from the position of chief engineer of the Panama Railroad in 1906 to the presidency of the Great Northern in 1919 at the age of 40. More recently, as president of the Burlington, he gained national recognition through active promotion of the use of modern streamlined trains. New honors came to him in 1940 when he was appointed transportation member of the Advisory Commission to the Council of National Defense, a position which he held until recently when the Office of Defense Transportation was set up.*



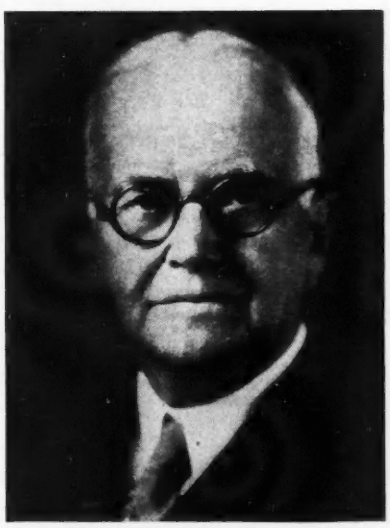
William Kelly, *military engineer and electric utility executive, graduated from West Point in 1899 and served as an officer of the Corps of Engineers until 1925. He went to France in 1917 in command of the 117th Engineers, later becoming deputy chief of staff of the A.E.F. After the war he was in river and harbor work for some time and then served as the first chief engineer of the Federal Power Commission. Leaving public service in 1925, Colonel Kelly went first with the National Electric Light Association and then with the Niagara Falls Power Co. He now is president of the Buffalo, Niagara and Eastern Power Corporation.*



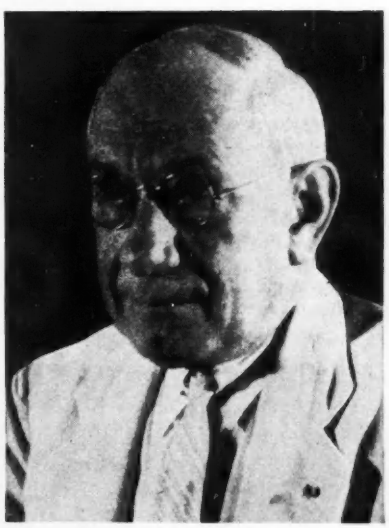
John Lucian Savage *has seen vast areas in the West change from sagebrush tracts to communities of comfortable homes and well-irrigated land, and has played no small part in bringing about the transformation. Although he started out after graduation in 1903 as an instructor at Purdue University, an opening in the Reclamation Service offered such an opportunity that he left teaching, and with the exception of a few years in outside irrigation and hydroelectric engineering has remained with it ever since, being in responsible charge of the design of such structures as Boulder, Shasta and Grand Coulee dams.*

New Am. Soc. C. E. Honorary Members

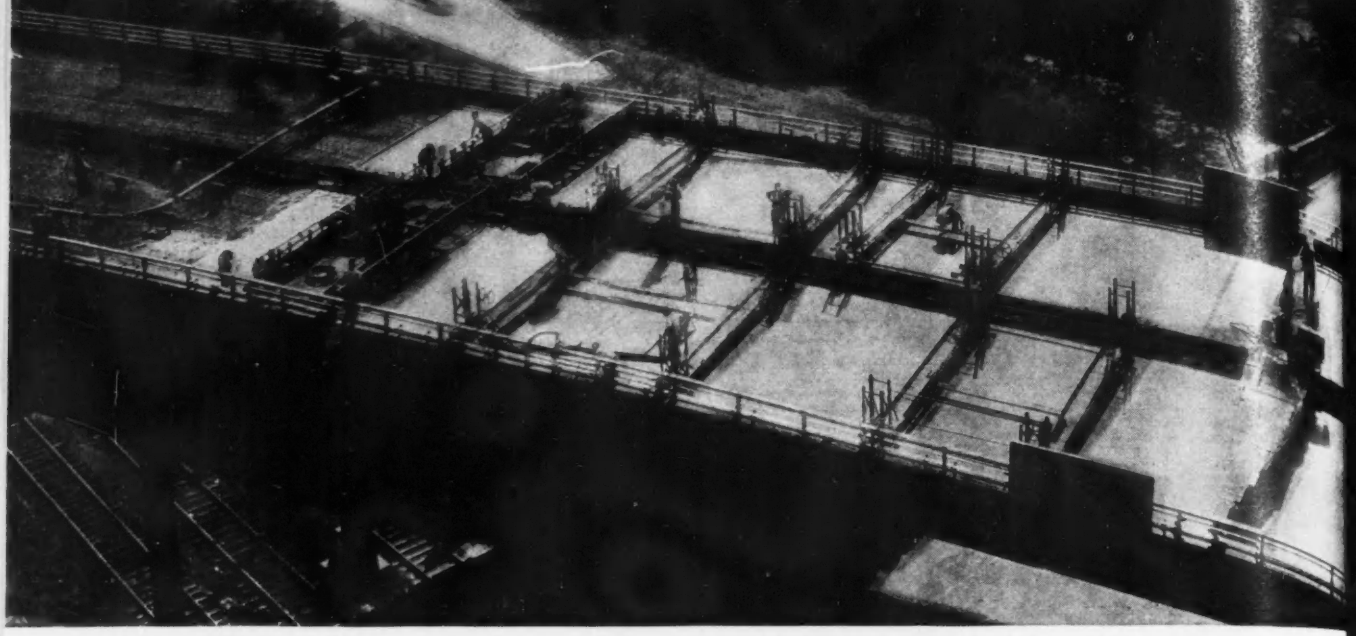
At the 89th annual meeting of the American Society of Civil Engineers in New York Jan. 21-23 the five outstanding men shown on this page were made honorary members.



Henry Earle Riggs *has had an active life as consulting engineer, teacher and officer of the Am. Soc. C.E. For twenty-five years after his graduation from the University of Kansas, Dr. Riggs engaged actively in railroad, waterworks, utility valuation and waterways matters, before going to the University of Michigan in 1912 as professor of civil engineering. He later became head of the department, and has held the title of honorary professor since 1930. In addition to teaching, he has found time for important consulting assignments, especially on railroad matters.*



Henry Matson Waite *has had a many-sided engineering career. For 15 years after graduation from M.I.T., he was in railroad work and in coal mining, and in 1912 he went to Cincinnati as city engineer. Two years later Dayton appointed him city manager, a pioneer undertaking for an engineer in which he won national recognition. During the World War he rose to be deputy director of transportation of the A.E.F., and upon returning to this country undertook the great task of building the Cincinnati Union railroad terminal. In recent years he has devoted much time to public service.*



Pipeline delivers concrete for paving deck. Two finishers operate side by side followed by bridges for hand-operated longitudinal floats and other finishing equipment. Asphalt curing emulsion is applied from bridge at right.

Concrete pumped for elevated roadway deck

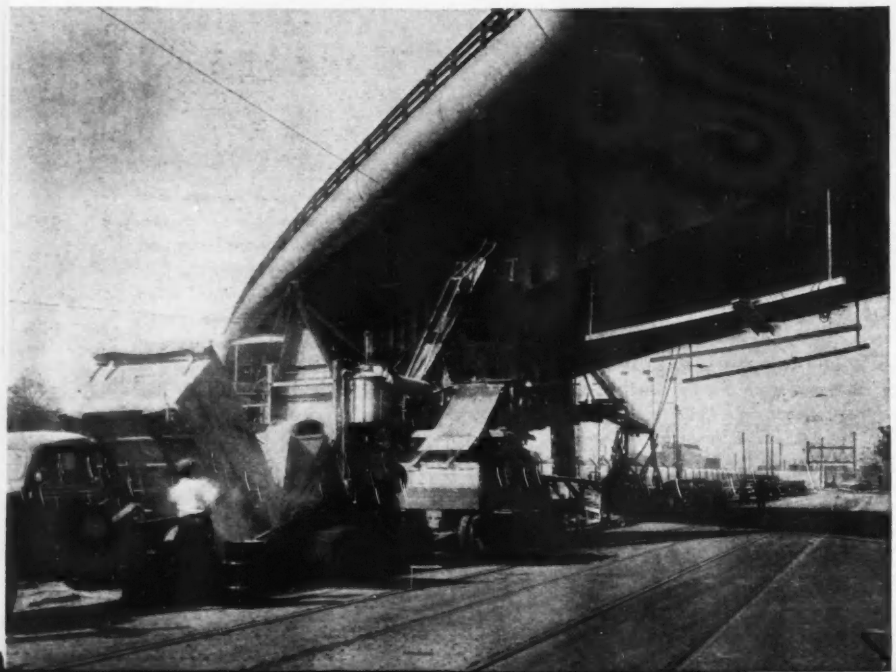
MODERN RAPID METHODS of construction are being used to pave the roadway deck of the modernistic Gowanus Elevated Parkway in Brooklyn, N. Y. The full width of the deck, 72 ft. in some areas, was placed at one time to avoid eccentric loading on the columns of the cantilevered roadway. The deck is 7¼ in. thick of 1:2:3½ concrete with high-early strength cement used on one section to permit early removal of the forms and to reduce the possiblity of cold weather damage.

The concrete is mixed in a 1-yd. paver which operates from the street level and feeds a trailer mounted concrete pump by means of an inclined boom and special bucket. The pump delivers the concrete through an 8-in. pipeline, sometimes more than 1,200 ft. long, to its final position on the roadway deck. The pipeline is laid along one side of the deck to the point where placing is under way and there is turned at a right angle and carried across the full width of the deck on wooden "horses." Ten-foot length of pipe are successively removed from the cross line as the deck slab is filled to grade on a 10-ft. advance. A length of pipe is then removed from the longitudinal line and the cross pipe reconnected for another advance.

Two adjustable-width concrete finishers are used with spans up to 36 ft. to permit each machine to pave half of the 4-ft. wide concrete center island and half the roadway, which in some places calls for two 11-ft. lanes and one 12-ft. lane each side of the center mall. The inside ends of the two finishers are operated on one of the upturned flanges of an I-beam set to exact grade to provide the correct roadway elevation. The outside wheels travel on the steel emergency walk, where plans called for this type construction, and on frame supported timbers where an emergency walk of concrete is required. The concrete above slab level, in the center island and emergency walks, is placed later.

Forms are made of light members, any one of which may be handled by one man. As may be seen by the accompanying pictures, almost no hardware is used for the forms except bolt hangers where the deep main girders also serve as the floor beams.

The Gowanus Elevated Parkway was

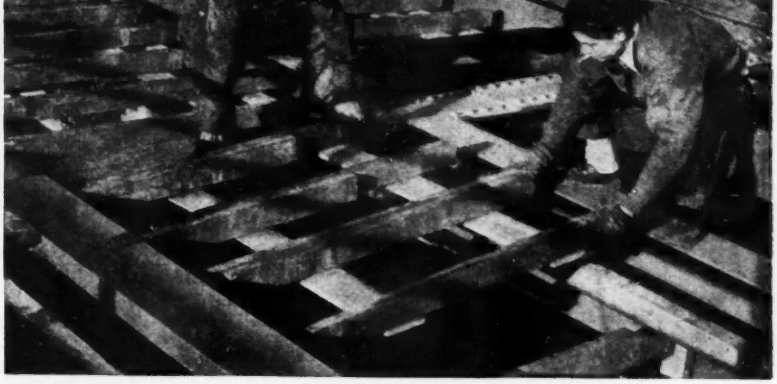


Inclined-boom paver delivers concrete to a double-cylinder concrete pump.

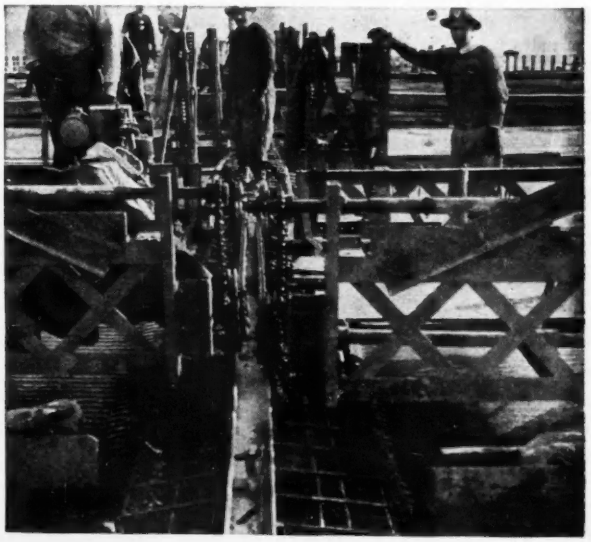
designed and its construction is being supervised by the engineering firm of Madigan-Hyland for the Triborough Bridge Authority, of which Robert Moses is chairman. For Madigan-Hyland, H. W. Hudson is in general charge with R. B. Dillenbeck and A. W. Groot, resident engineers.

The deck paving described is on the two contracts held by Corbetta Construction Co., New York, for whom Rocco Langalotta is superintendent.

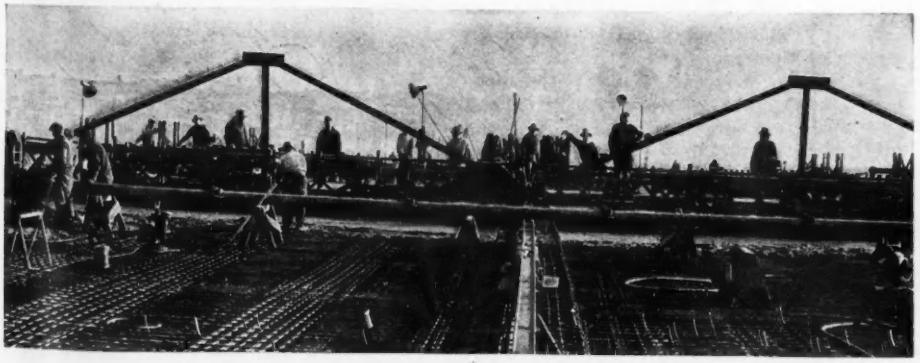
Where curb and emergency walk are of concrete the arrangement shown below is used for supporting the outer ends of the finishing machines and float bridges. Concrete above slab level is placed later.



Longitudinal runners rest on frames supported on the bottom flange of the floor beams. A prepared frame is next placed on the runners, which are then wedged-up as in right foreground. A ⅝-in. thick layer of plywood completes the deck form.



An I-beam with flange edges up, as shown above, forms the center track for the two finishing machines. Concrete required above roadway level for the 4-ft. wide center curb is placed later.



Two finishers (left) span 72 ft. to place concrete for six lanes of parkway deck simultaneously.

PRIORITIES GUIDEPOST

Current notes on what, who and how

TIGHTER CONTROL over use of the priority rating granted to builders of privately-owned defense housing is provided in an amended form of the P-55 order issued by the Priorities Division of OPM. A P-55 order granted to a builder gives him a priority rating on all his purchases of goods listed on the Defense Housing Critical List. The builder may only use the rating for definite quantities of material as specified in his application for the rating. Applications are made to the nearest field office of the Federal Housing Administration.

Big change in the amended form of P-55 is that whenever a builder uses the rating to get material from a building supply distributor or when a distributor extends the rating to get material from a manufacturer, the purchase order must be countersigned by an FHA official. Another change makes it impossible for manufacturers to extend the rating in order to get the materials they need to manufacture building supplies. Instead, manufacturers should apply to OPM on form PD-25-a for a blanket rating on their material requirements under the so-called Production Requirements Plan.

A decision is now in the making as to how much longer priority aid shall be extended to privately-financed housing. As originally set up, the housing priority plan was limited to 200,000 dwelling units. Ratings have now been issued on more than 150,000 units, and Spring building programs will quickly exhaust the quota. The housing coordinator is now discussing with Priorities Division the possibilty of extending the quota.

OPM LAST WEEK greatly simplified the use of the so-called "PD" priority ratings. These are the original form of rating, attached to a particular order for specific goods. They have been largely displaced by various forms of blanket and project ratings covering the entire requirements of a job. But the individual ratings still have an important trouble-shooting function to meet situations now covered by the blanket orders.

On the new plan, forms PD-1, PD-2, and PD-3 are abolished. In their stead are two forms—PD-1A and PD-3A. The latter is used to attach a rating to an order placed by a government agency and is issued by the procurement officer concerned. PD-1A is used on other defense orders; application is made to OPM on the form, and when it is approved the application form itself becomes the rating. Either rating may now be extended indefinitely without the countersignature of any government official.

AGC Convention Notice

Associated General Contractors of America will hold their annual convention in Indianapolis, Ind., (Claypool Hotel) Feb. 16–18.

Originally scheduled to be held in Seattle, Wash., the meeting place was shifted because of war conditions. A notice in last week's issue erroneously listed Seattle as the convention city.

• • •

Tacoma lets contracts for new power plants

The Tacoma Board of Contracts and Awards recently let contracts for $1,800,000 worth of equipment to be used in expanding the city's Nisqually hydro-electric project. The new equipment includes a 55,000-hp. turbine and a 40,000-kw. generator for the La Grande power house and two units, each consisting of a 34,500-hp. turbine and a 25,000-kw. generator, for Alder power house which is to be built upstream on the Nisqually River on which the old La Grande power house with its four 6,000-kw. generators was built many years ago.

In planning the enlargement at the La Grande power house, it was necessary to provide additional storage. A suitable site for a new dam was found some six miles upstream and here a concrete arch dam some 300 ft. high is to be built. Alder power house is to be located immediately adjoining this dam. The afterbay of the Alder plant, extending 1½ mi. or more downstream, will supply a 6,500-ft. tunnel 14½ ft. in diameter which will deliver water under pressure to the penstocks for the new power unit at La Grande. A surge chamber of the non-spilling type has been designed for the lower end of the tunnel.

• • •

Phillips Petroleum to lay 900-mile gas line

Phillips Petroleum Co. has announced plans for construction of a 900-mile natural gas pipe line from the Texas Panhandle into southern and eastern Wisconsin.

Wisconsin Gas Transmission Co., a subsidiary of Phillips Petroleum, has received a conditional order from the Wisconsin Public Service Commission authorizing construction of the line, which would supply gas to ten public utility companies operating 15 distributing systems.

The decision to undertake construction of the pipe line was made after a survey showed that some $318,000,000 in defense contracts have been awarded to 229 industrial firms to be served in this area.

Rochester will buy water to avert shortage

A threatened water shortage has forced the city of Rochester, N. Y., to seek an additional supply, amounting to about 3 mgd., from the Eastman Kodak Co. In 1934 it was necessary for the city to employ these private water facilities to augment its supply. According to City Engineer Henry L. Howe, Jr., the purchased water will be chlorinated and ammoniated by means of equipment installed during the 1934 emergency near the Kodak Company's pumping plant.

Rochester is now consuming between 28 and 29 mgd., which is about 3 mgd. over the average for this time of year. Rainfall in the Rochester area in 1941 was six inches below a 50-year average, and this deficiency coming at a time when increased demands are being made by industries engaged in war production work, accounts for the present shortage. The city will obtain the additional supply on an actual cost basis.

• • •

Propose $225,000,000 for shipyard improvements

Authorization for $845,000,000 in new shipbuilding and repair facilities has been granted by the House. It passed and sent to the Senate a measure authorizing $500,000,000 for shipbuilding, $275,000,000 for ship-repair, $70,000,000 for facilities to manufacture Naval ordnance. Only a comparatively small and indeterminate part of this money will be used for construction; bulk of it will go for machines and tools.

It is proposed to spend $100,000,000 in improvements to Navy Yards, $125,000,000 in private yards. Another $100,000,000 is to be spent on air-raid protection of shipyards and the plants supplying the yards. Remainder of the money is to go for increased facilities in plants tributary to the shipyards and will represent machinery almost entirely.

• • •

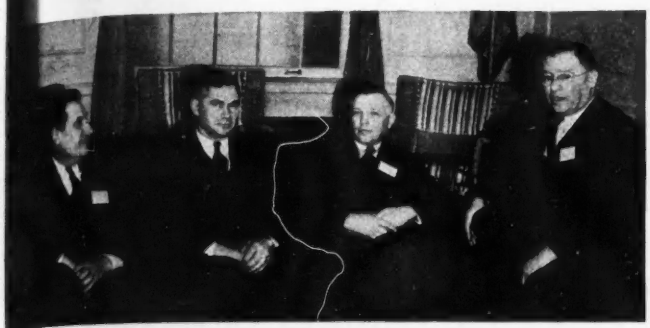
AWWA nominates Wolman for president

Abel Wolman, consulting sanitary engineer and Professor of Sanitary Engineering at the John Hopkins University, was nominated for the presidency of the American Water Works Association at a meeting of the directors on Jan. 19. At the same time Samuel Morris, Dean of the School of Engineering at Stanford University, was nominated for the post of vice president.

William W. Brush, editor of "Waterworks Engineering" and for many years treasurer of the association, was nominated to continue in that office.

...een and Heard at ...idwest A.G.C. Meetings

...e chapters and branches of the Associated General Contractors ...e Midwest held their annual meetings during the week of Jan. 5. *ENR* editor managed to get to four of these sessions with the results ...n here.



...officers of Central Branch pose with their secretary at ...Moines. E. B. Spencer, Waterloo, Ia., vice president; E. M. ...berg, Clear Lake, Ia., president; F. H. Carlson, Decorah, ...ice president; and O. W. Crowley, who starts his 21st ...as executive secretary.

Lieut. Col. C. W. Ball, U. S. District Engineer at Rock Island, addressed Central Branch on the new setup of all army construction under the Corps of Engineers.

...Neely, secretary of the Associated Building Contractors of ...as proudly stands with his most famous member, M. W. ...son., A.G.C. national president. M. W. spoke at all five ...entions.

H. E. Foreman, managing director, A.G.C., snapped at Des Moines, but Doc looked just the same at Springfield and at the three meetings in Kansas City.

Two veterans of the Iowa Department of Highways were on hand to bolster up their chief. C. Coykendall is administrative engineer and L. M. Martin has been holding down the district engineer job at Council Bluffs ever since the department was organized.

...y Winn, new president of the Kansas City Chapter cheer- ...accepts the gavel from retiring president Lyle Fogel, who ...es a sigh of relief.

Harry Palmer, secretary of the Kansas City Chapter, thanks the boss of Kansas City construction, director of public works, A. C. Everham, for his talk on civilian defense.

MEN AND JOBS

Charles O. Quade, formerly with the Denison District, U. S. Engineers, and recently assistant to the resident engineer of the Fort Worth, Texas, bomber plant project, has been named resident engineer at Karnack, Tex., on the government's $16,000,000 TNT plant. He will be assistant to Capt. Ralph L. McDaniel, formerly with the Quartermaster Corps at Fort Worth, who is now area engineer of the U. S. Engineers.

Manson H. Bailey, Sr., acting city engineer of Glasgow, Mont., has resigned to accept a position with the U. S. Engineers, Fort Peck, Mont., office.

James T. Anderson, of Raleigh, N. C., industrial engineer for the North Carolina State Department of Conservation and Development for the past four years, has been appointed North Carolina director of the division of contract distribution of the Office of Production Management. **Cecil E. Bell,** of Raleigh, assistant industrial engineer with the conservation and development department, has been named Anderson's assistant in his new post. Both have been granted leaves of absence from their regular duties.

Vernon Miller, of Indianola, Iowa, has been appointed county engineer of Humboldt County, succeeding Kenneth J. Smith who resigned. Mr. Miller formerly had the same position in Warren County, Iowa.

Lieut. G. T. Swiggum, of Grand Forks, N. D., has been named resident engineer on a $4,000,000 floating drydock repair project at South Portland, Me.

Winston C. Larson, consulting engineer, has been engaged by the Detroit Lakes, Minn., city council to act as consulting engineer for its sewage system. He succeeds the late A. A. Hawkinson, under whom he worked as an assistant for many years.

Charles R. Bowers, of St. Paul, Minn., district airport engineer of the CAA, has been granted leave of absence to become general manager of the Helena, Ark., Technical School, where primary training is being given Army Air Corps cadets.

D. Lee Hooper, district engineer, U. S. Engineer Office, Pittsburgh, Pa., has been promoted from a lieutenant-colonel to the rank of colonel. **Herbert D. Vogel,** executive officer in the Pittsburgh office, has been promoted from major to lieutenant-colonel.

J. Roland Carr, civil engineer and for 11 years designer of river bridges and grade separation structures for the Wyoming State Highway Department at Cheyenne, Wyo., has resigned to accept a position with the American Bridge Co. at Gary, Ind. Mr. Carr holds a bachelor of science and civil engineering degree from the University of Kansas. After leaving college he worked for the Kentucky State Highway Department at Frankfort, in the bridge design office for three years. Mr. Carr was later associated with the Gary office of the American Bridge Co., from 1928 to 1930. He was in charge of publicity for the 20th annual convention of the Western Association of State Highway Officials held at Casper, Wyo., in June, 1991, as well as serving as publicity chairman for the Wyoming Engineering Society.

J. ROLAND CARR

Clayton W. Paige, city engineer and street superintendent of Alhambra, Cal., for the past nine years, has resigned to accept a position as city engineer at Burbank, Cal. The rapidly expanding population of Burbank and the consequent need of increased traffic, housing and sanitation facilities, due to activities of the Lockheed and Vega airplane plants, makes his new position one of unusual importance at this time.

Griff W. Nicholls has been appointed city engineer of Sharon, Pa., succeeding **Col. Lewis E. Burnside.**

William R. Mark, Jr., former sanitary engineer of the district health unit at Council Bluffs, Iowa, has resigned this position to become supervisor of public health engineering activities in a five-state area composed of the states of Michigan, Wisconsin, Illinois, Indiana and Ohio for the U. S. Health Service at Chicago, Ill. Mr. Mark had been associated with the Iowa State Department of Health for 14 years.

Orville T. Upp has been appointed county engineer of Wapello County, with headquarters at Ottumwa, Iowa. He succeeds **Harry Hansel.**

J. D. Levin, construction engineer, Public Buildings Administration, FWA, has been relieved from duty in connection with the construction of the post office in Audubon, Iowa, and supervision over various post office repair projects in Iowa and Nebraska, to become superintendent of construction of a new industries building at the Federal Reformatory at El Reno, Okla.

F. H. Lovell, designing engineer of the central region of the Pennsylvania Railroad system, has been appointed assistant engineer of bridges and buildings. He succeeds **J. P. Walton,** who has been promoted to engineer of bridges and buildings for the western region, with headquarters in Chicago.

M. C. Zimmerman, formerly of the Kansas State Highway Commission, is now concrete engineer for Lockwood & Andrews, and David M. Fuller, associated engineers on the San Jacinto Ordnance Depot, Houston, Tex.

Wilson E. Stroup, for several years bridge engineer for the WPA in Topeka, Kan., has accepted a position with E. I. duPont de Nemours & Co. at Pryor, Okla.

Arnold H. Vanderhoof, civil engineer, of Asheville, N. C., a lieutenant in the U. S. Navy (retired), has been called to active duty and has assumed charge of the U. S. Hydrographic office at Savannah, Ga.

Maj. Lyle Rosenberg, operations officer of the U. S. Engineers, Los Angeles, Cal., since 1938, has been transferred to Caddoa, Colo., where he will serve as district engineer. In his Los Angeles post, Major Rosenberg supervised construction of Hansen, Sepulveda and Prado Dams and the Los Angeles River flood control project; construction totalling nearly $50,000,000.

Louis O'Sullivan, civil engineer, has been appointed executive assistant in the Montreal Light, Heat & Power, Consolidated organization. He has been a member of the company since 1923 and has held the positions of field engineer, designing engineer and transmission and right-of-way engineer. He is a graduate of McGill University.

N. F. Brookes has severed his connection as general superintendent of the Reno Gold Mines, Ltd., Central Zeballos property, to join the operating staff of the International Nickel Co. of Canada, Ltd., at Copper Cliff, Ont.

J. B. Dalhouse, associate highway engineer with the U. S. Public Roads Administration, Raleigh, N. C., has resigned this position to take up active duties as first lieutenant, U. S. Army, at Fort Eustis, Va.

Engineers to be schooled in bombing protection

For a week, beginning Feb. 16, some 350 engineers and architects and 50 civil engineering teachers from cities, colleges and industrial plants throughout the country, are going to attend a national training conference in aerial bombardment protection at New York University. At the conclusion of the week the engineers and architects will return to their homes to put what they learned into practice, while the teachers will remain for an additional two days of discussion the better to fit them for conducting similar training courses for engineers and architects in their own local communities. Held under the auspices of the Federal Office of Civilian Defense, the U.S. Office of Education and New York University, the conference is designed to acquaint as many specialists as possible, as quickly as possible, with the latest test data and design theories in this new and vitally important field of engineering practice. The OCD in Washington has requested the American Society of Civil Engineers to urge each local section to send a representative to this training course.

A total of 35 lectures will be presented morning, afternoon and evening at the School of Education Auditorium, New York University, 35 W. 4th St., New York City. Professors Harold E. Wessman and William A. Rose, of New York University, have the major assignments, handling a total of 16 lectures. The remaining lectures will be given by experts from the Army and various governmental departments.

• • •

Big water sale is good and bad for St. Louis

The water department of the city of St. Louis recently signed its biggest contract for an individual consumer, estimating that its revenue from this contract would amount to $182,000, and then glumly announced that it would lose about $11,000 per year on the transaction. Under the special manufacturer's rate made by the city, any amount of water used over 1,000,000 cu.ft. is delivered at the rate of 5 cents per 100 cu.ft. The water department estimates that it costs the city slightly more than six cents per 100 cu.ft. to deliver water.

Water Commissioner Thomas J. Skinker announced that the huge U. S. small arms ammunition plant, now being completed at Goodfellow and Bircher Boulevards, had signed a contract for the use of an estimated 8 mgd. This amount, said Commissioner Skinker, is approximately three times as much as purchased by the city's next largest consumer, the Anheuser-Busch, Inc.

Black elected president of civil engineers

Ernest B. Black, senior member of the consulting engineering firm of Black & Veatch of Kansas City, was elected president of the American Society of Civil Engineers on Jan. 21. Mr. Black has been in consulting work since 1909, specializing in sanitary and power work, first with the J. S. Worley Co., then as Worley and Black, and since 1915 as Black & Veatch. From 1916 to 1919 he also was a partner in the firm of Thompson and Black.

During the early days of the first World War Mr. Black was engaged in the construction of Camp Pike. Subsequently he was commissioned in the Signal Corps and then transferring to the Air Corps for aircraft production work, being discharged with the rank of major. In the present war, his firm was in charge of the design and construction of Camp Chaffee, near Fort Smith, Ark.

Other officers elected at the annual meeting were, vice presidents, Charles M. Spofford, professor of civil engineering, emeritus, Massachusetts Institute of Technology, and member of the consulting firm of Fay, Spofford & Thorndike, Boston; Thomas E. Stanton, materials and research engineer, California Division of Highways, Sacramento; directors, V. T. Boughton, associate editor, Engineering News-Record, New York; George W. Burpee, member of the consulting firm of Coverdale & Colpitts, New York; Scott B. Lilly, chairman of the division of engineering, Swarthmore College, Swarthmore, Pa.; A. M. Rawn, chief engineer and general manager, Los Angeles County Sanitation Districts, Los Angeles; Wm. D. Dickinson, member of the firm of Dickinson and White, Engineers, Inc., Little Rock, Ark., and John T. L. McNew, head of the department of civil engineering at the Agricultural and Mechanical College of Texas.

Oil refinery construction to aggregate $75,000,000

Construction of more than $75,000,000 worth of new refining capacity for 100-octane aviation gasoline is provided for in agreements completed last week between three oil companies and the Defense Supplies Corp., an RFC subsidiary. The agreements, with Standard of New Jersey, Magnolia Petroleum, and Texas Co., provide for more than 35,000 bbl. a day of new capacity. And this is only a beginning. Much larger expansions of capacity are in the works.

Bulk of the expansion is to be provided by Standard of N. J., which will build $50,000,000 of new capacity. RFC is lending the company $14,400,000 of this. The new plant will produce 21,000 bbl. daily. The Magnolia program calls for 9,000 bbl. per day of new refinery capacity at a cost of $15,000,000, of which RFC is providing $4,500,000. The Texas Co. will build refineries costing $11,500,000 to produce 5,500 bbl. They will borrow $8,500,000 from RFC.

• • •

Amendments to Lanham Act approved by Congress

As finally approved by Congress last week the amendments to the Lanham Act make only a few important changes in this underlying law which governs the construction of defense housing. The permitted average cost per unit is raised from $3,500 to $3,750 in the continental United States and from $4,000 to $4,250 outside. Top limit on the cost of any house is raised from $3,950 to $4,500.

Where previously rentals were to be based on the income of prospective tenants, they are now to be based on an economic rent, but adjustment is permitted where necessary to provide for low-income tenants. Provision is made for payment to local governments of sums in lieu of taxes substantially equal to what would be paid if the projects were not tax exempt.

• • •

Legislation to raise truck weight protested

Pending federal legislation which would give the Interstate Commerce Commission power to raise truck weights and sizes throughout the country has been vigorously protested by Pennsylvania's Secretary of Highways I. Lamont Hughes.

Similarly, the Pennsylvania State Highway Department opposed state legislation in 1941 to increase the weight of trucks permitted to use state highways on the grounds that the roadbeds could not stand up under the additional weight.

Houston allocates funds for public works

With $8,500,000 to spend from a recent bond issue, Houston, Tex., will undertake public works improvements amounting to a total of $2,622,000 during 1942. The balance of the $8,500,000 fund will be spread out over the following two years.

The 1942 expenditures have been set up as follows: for sanitary sewers, $1,000,000; airport, $500,000; flood control, $350,000; rights-of-way, $182,000; bituminous paving, $125,000; permanent paving, $100,000; storm sewers, $100,000; fire stations, $40,000, and parks, $25,000.

R. J. Cummins, head of the sub-committee considering flood control bonds, reports that Col. L. H. Huett of the U. S. Engineers, is ready to let the contract for construction of Barker Dam.

• • •

War economy strikes New Mexico road employees

Anticipating a saving of about $20,000 a month in salaries plus cancelled equipment rentals, the New Mexico State Highway Commission last week dismissed 125 highway maintenance employees, according to Burton Dwyre, state highway engineer.

The personnel cut was deemed necessary as an economy move in the face of an expected drop in state revenues, particularly gasoline tax receipts. Mr. Dwyre states that the employee reduction would not mean an immediate reduction in the number of highway miles maintained by the state. The outcome of the highway department's maintenance activity, however, will depend largely upon the effect of tire-rationing upon future gasoline tax returns.

The highway department estimates that about $13,000 will be saved in salaries and about $7,000 in equipment, rentals and expenses.

• • •

New York to reduce work on projected parkways

Projected expenditures of $30,000,000 over the next two years on an expansion of the New York State parkway system, authorized by the voters in November (*ENR*, Nov. 13, p. 692) are to be drastically curtailed in view of the war emergency, according to an announcement by Arthur W. Brandt, superintendent of the department of public works.

Much of the postponed work is on parkways serving New York City. The extent to which work already under way will have to be curtailed is not yet known, but it is probable that only such new work as is considered essential to the defense of the region will be undertaken.

JOBS OF THE WEEK

EMBARKATION CAMP, Stelton, N. J.
George M. Brewster & Son, Inc., of Bogota, N. J., and John A. Johnson & Sons, Brooklyn, N. Y., will build an embarkation army camp, including barracks for the War Department, Washington, D. C. The estimated cost is $23,000,000. Tuttle, Seelye, Place & Raymond, New York, are architects. E. E. Seelye, New York, N. Y., is engineer.

TORPEDO PLANT, Forest Park, Ill.
R. C. Wieboldt Co., Chicago, Ill., has been awarded a contract by Amertorp Corp., c/o American Can Co., New York, N. Y., to construct a Navy Torpedo Plant. Estimated cost is $10,000,000. Albert Kahn and Associates, Detroit, Mich., are engineers and architects. Defense Plant Corp. will finance.

PLANT, Des Moines, Ia.
Weitz Co., Inc., and McLaughlin Brothers, of Des Moines; Central Engineering Co. and Priester Construction Co., of Davenport, have been awarded an additional contract for plant, (type of structure withheld) by War Department. Estimated cost is $8,500,000. Smith, Hichman & Grylls, Inc., Detroit, Mich., are architects.

BLAST FURNACE, Braddock, Pa.
Arthur G. McKee Co., Cleveland, O., will construct two blast furnaces and accessory buildings for Carnegie Illinois Steel Co., Pittsburgh, Pa. The estimated cost is $6,000,000. M. W. Reed, Pittsburgh, is chief engineer for steel company.

TANK PLANT, Grand Blanc, Mich.
Darin & Armstrong, Inc., Detroit, Mich., will construct 1-story, 1,260x380x580 ft. brick, steel, reinforced concrete tank plant for Fisher Body Division, General Motors Corp., Flint, Mich. Estimated cost is $4,800,000. Defense Plant Corp. will finance.

PLANT, Louisville, Ky.
Hycar Chemical Co., c/o B. F. Goodrich Rubber Co., and Phillips Petroleum Co. awarded contract for the construction of plant addition for War Department to Batson-Cook Co., Inc., of West Point, Ga. Estimated cost is $2,750,000. Defense Plant Corp. will finance.

BLUESTONE DAM, West Virginia
Dravo Corp., of Pittsburgh, Pa., will construct Bluestone flood control and hydroelectric power dam on the New River near Hinton, W. Va. The successful bid, which was second highest when U. S. Engineers opened bids December 16, was $11,376,080.

HOUSING, Los Angeles, Calif.
R. E. Campbell Co., Compton, Calif., has been awarded a contract for 800 two-family housing project, Aliso Village, by Los Angeles Housing Authority, at $2,075,000. Housing Group Architects, Los Angeles, Calif., is architect.

PLANT, Texas City, Tex.
Tin Smelting Corp., of Texas City, Tex., awarded contract for new plant unit to Ford, Bacon & Davis, New York, N. Y. Estimated cost is $2,000,000. RCF will finance. N. V. Billiton-Maastchapij, c/o J. Van der Broek, New York, N. Y., will operate.

HOUSING PROJECT, Washington, D. C.
C. B. Ross Co., Inc., of New York, N. Y., was lowest bidder for constructing 200 unit USHA housing project on James Creek Housing development for Alley Dwelling Authority, Washington, D. C., at $1,137,000.

DAM, Tennessee
Massman Construction Co., Hamilton Construction Co., and Metcalfe Construction Co. of Kansas City, Mo., have been awarded a contract for constructing Center Hill Dam, on Caney Fork River, 14 mi. from Carthage, Mo. The dam will be used for power and water conservation and is part of the Cumberland River Project. U. S. Engineers, Nashville, negotiated contract. Estimated cost is $25,000,000.

ROADS, Indiana
Indiana State Highway Commission, Indianapolis, Ind., has awarded a contract for constructing 5.364 miles of reinforced concrete paving on State Road 2, South Bend, St. Joseph's County to Bontranger Construction Co. of Elkhart, Ind., at $599,802. Thomas McQueen Co., Forest Park, Ill., received contract on 6.723 miles on State Road 30, Valparaiso, Porter and LaPorte Counties, at cost of $611,386. M. R. Keefe is chief engineer for state highways.

RUNWAYS, Aberdeen Proving Ground, Md.
C. J. Langenfelder & Sons, of Rosedale, Mo., has been awarded a contract to build runways, taxiways, etc., at airport, by U. S. Engineers, Baltimore. Cost will be $904,267.

NOTE—Additional bidding and contact news on over 800 projects large and small appear in the Construction News sections beginning on page 19.

Equipment distributors hold biggest session

Breaking all records with an attendance of over 400 manufacturers and distributors, the Associated Equipment Distributors held their largest and probably most important meeting in Chicago last week at which their part in the war program was discussed. A scheduled program, including association and government speakers, occupied the first three days of the session. The remainder of the week was devoted to manufacturer-distributor get-together meetings.

H. K. McCook, head priority specialist, material division, O.P.M., had his hands full answering scores of questions from perplexed makers and dealers of construction equipment and supplies about the priorities situation. Prior to the question period, he pointed out that while combat requirements come first at the moment the country must maintain a solid economy. Now less than 20 percent of the nation's productive capacity is going into armament, he said, and it is doubtful in more than 50 percent of our capacity (the ratio in Canada and England) can be utilized for war purposes because we must supply raw materials to our Allies.

Other speakers from Washington were Joel Dean, office of price administration; Paul Newton and B. T. Bonnot, O.P.M.; and Capt. Robert Richardson, office of Chief of Engineers.

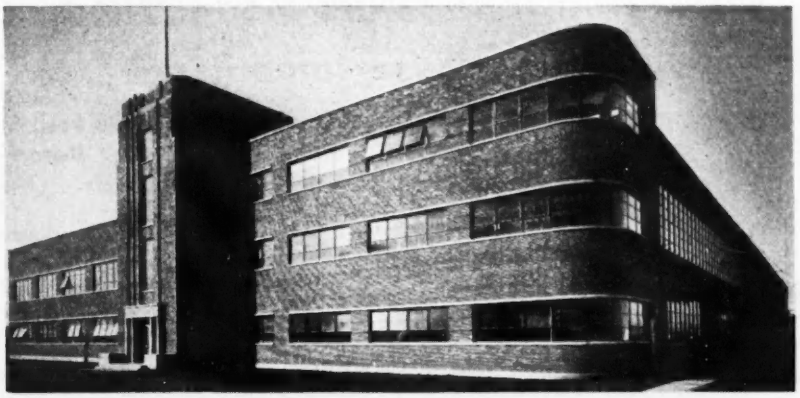
• • •

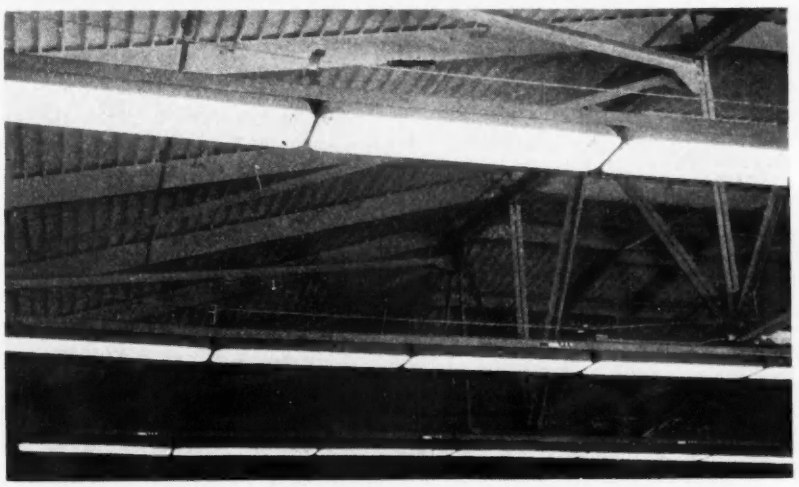
Denison Dam spillway bids due next month

Bids for construction of the spillway on the Texas side of the 150-ft. high abutment at Denison Dam will be opened not later than Feb. 15, it has been announced by H. L. Johnson, engineer on the $50,000,000 flood control and power project. It is expected that the contract will be let about April 1, and construction will be under way early in May.

A contract for building superstructures across the Washita arm of the Red River in Oklahoma, over which the Frisco railroad tracks and the state highway will be relocated, is scheduled to be awarded by March 1. Substructures for the relocation phase of the dam and reservoir are already in place across the Washita River; all the concrete piles have been driven at the west end, and contractors are now precasting piles to be driven in the two piers of the river span.

Plans and specifications for the remainder of the work on the railroad relocation are now being prepared for submission to the chief engineer in Washington. Designs are also being made for the bridge to carry the highway across the Washita River.





Ten thousand lineal feet of fluorescent lighting

The Hygrade Sylvania Corporation has recently completed at Danvers, Mass., a 105,000 sq.ft. plant where an average of about 100,000 fluorescent lamps are produced per day.

Lamp production is concentrated in an unobstructed manufacturing area 100 ft. wide and 380 ft. long, entirely free from inside columns, on the second floor of the plant. Continuous trough lighting units are installed throughout the plant (as illustrated above) on 10-ft. centers providing minimum intensity of 72 foot-candles for all working areas. In the main manufacturing section these units have been suspended from messenger cable strung from the bottom chord of the trusses so that hangers were unnecessary. A total of 1,023 units, including 18 different types, with over 10,000 lin.ft. of fluorescent tubes are used.

A special ventilating system designed to maintain dust-free conditions and provide temperature control has been included in the plant layout. Fresh air is washed and filtered in a series of chambers at ground level outside the building proper, where hot water lines and deep well water will be used for central heating and cooling. The air is distributed through an underground system of 400 lin.ft. concrete pipe, 8 ft. in diameter. Ducts leading directly from this network of pipe have been brought up alongside the first floor columns with outlets about 2 ft. above the floor at each level. Used air can be either washed and recirculated through return ducts to the central system or exhausted through the windows.

The building was designed and constructed by the Austin Co., engineers and builders.

Start designs for new Bonneville substation

Officials of the Bonneville Power Administration have started design work for a new $1,000,000 substation to serve a 40,000,000-lb. aluminum reduction plant to be constructed at Tacoma, Wash. and will tie-in with the Tacoma municipal power system.

Paul J. Raver, Bonneville administrator, said the new substation would be supplied with power over a 115,000 volt line completed between Bonneville's Covington substation and Tacoma. A second 115,000 volt line will be constructed between Covington and Tacoma as a part of the Bonneville power administration's construction program starting next July. Funds for this line are included in the $30,000,000 appropriation granted the power administration by Congress recently.

Minnesota contractors pledge their aid to local defense committees

Contractors interested in government work are urged to keep in close touch with local district offices of U. S. Engineer Department, naval public works officers and highway departments.

Meeting in their 23rd annual convention at Minneapolis last week the Associated General Contractors of Minnesota pledged their services and resources to Gov. Harold Stassen for the civil defense program. This action was taken by a resolution passed following talks by M. W. Watson, president, and James Marshall, assistant managing director, Associated General Contractors of America, and H. W. Richardson, Western Editor, *Engineering News-Record*, all of whom pointed out the need for contractors' counsel, personnel and equipment in the local defense work.

Mr. Watson was introduced by the venerable J. H. Ellison, second president of the Minnesota chapter and eighth president of the national A.G.C. Mr. Ellison was paid a standing tribute by all those in attendance, for he represents a fading generation of pioneer contractors that sprang from the Twin Cities area and includes such names as Winston, Guthrie, Foley, Ffolliott, Leighton and Oakes—all having an important part in the development of the West and Northwest.

Post-war highways

Mr. Watson spoke of the work immediately at hand and also looked ahead to post-war days. He pointed out that the new army of 3,600,000 men would probably double the camp and army housing requirements. The building of munitions plants, aircraft factories and other facilities for the war effort "has only just started," he declared. "After the war the construction emphasis will be on highways, for we never have caught up with automobile production in building roads, and because of heavy military traffic and neglected maintenance during the war period, the need for road construction will be greater than ever," he said. Housing for the readjustment of war industry workers is another big post-war job which offers possibilities for study, Mr. Watson believes.

Where to get work

Mr. Marshall pointed out that the war has changed the relationship between the construction industry, contractor associations and the government. "Work for contractors is no longer coming through normal channels," he said, "and therefore those interested in military construction must keep in touch with their local district offices of the U. S. Engineers, naval public works officers, highway departments and other agencies charged with award of contracts." He also spoke of construction labor relations, praising labor for its cooperation in building for defense. "In the face of rising living costs," he said, "labor is now trying to keep ahead of the rise, and we may expect numerous demands for wage increases."

Full cooperation with local civil defense committees offers the best opportunity for public relations for contractors, Mr. Richardson said. "By helping these committees keep on an even keel, by offering your organization and equipment in case of a local catastrophe, and by showing your neighbors that you are willing to help protect life and property, you will do much to dispel the unfavorable opinion the public has of contractors," he declared.

Minnesota's highway program for the current year will consist only of $8,000,000 in contracts carried over from 1941 plus "whatever the government hands us," said M. J. Hoffmann, state highway commissioner, in outlining the road building prospects for the year. This compares with a $14,000,000 program last year. Lt.-Col. John W. Moreland, U. S. district engineer, St. Paul, told of the new setup in the concentration of all army construction under the Corps of Engineering.

Tires for contractors

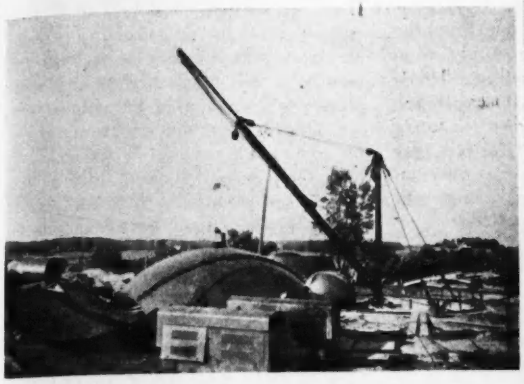
Theo. G. Driscoll, in charge of tire rationing in Minnesota, faced a barrage of questions regarding the obtaining of tires by contractors. He made it plain that tires would be available only for actual use on the job, or in direct hauling for the job, which would exclude tires for cars of superintendents and foreman traveling around the work. He urged that contractors educate their men to the seriousness of the tire situation and the necessity for conserving rubber supplies.

W. D. Connor, Jr., chief, lumber unit, building materials branch, OPM, came from Washington to talk about priorities and the materials situation. He looks for a further curtailment in metals used in construction, excluding high priority projects. He also predicts a construction volume of 11 billion dollars for 1942, the highest estimate yet made by official Washington.

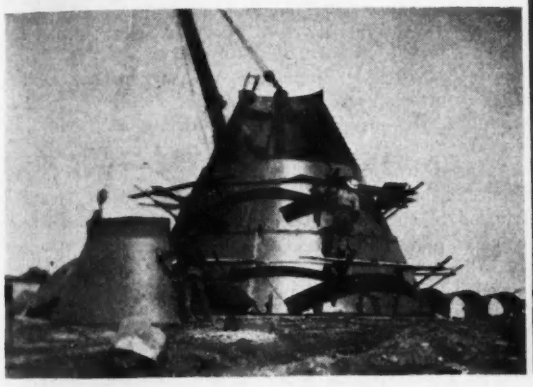
Most officers of the Minnesota chapter were re-elected for another term. These are: president, O. W. Swanson; vice-presidents, W. M. Cederstrand, Palmer Ulland and C. F. Scully. Frank B. Winston was selected for secretary-treasurer. New directors include S. W. Leck, L. M. Feller and Frank B. Winston. Robert J. Hendershott is manager.

Members of the Minnesota A.G.C. gather for their 23rd annual convention in Minneapolis. President O. W. Swanson sits alone in the front left seats. Manager R. J. Hendershott sits next to the aisle in the front row, along with Lieut.-Col. John W. Moreland.

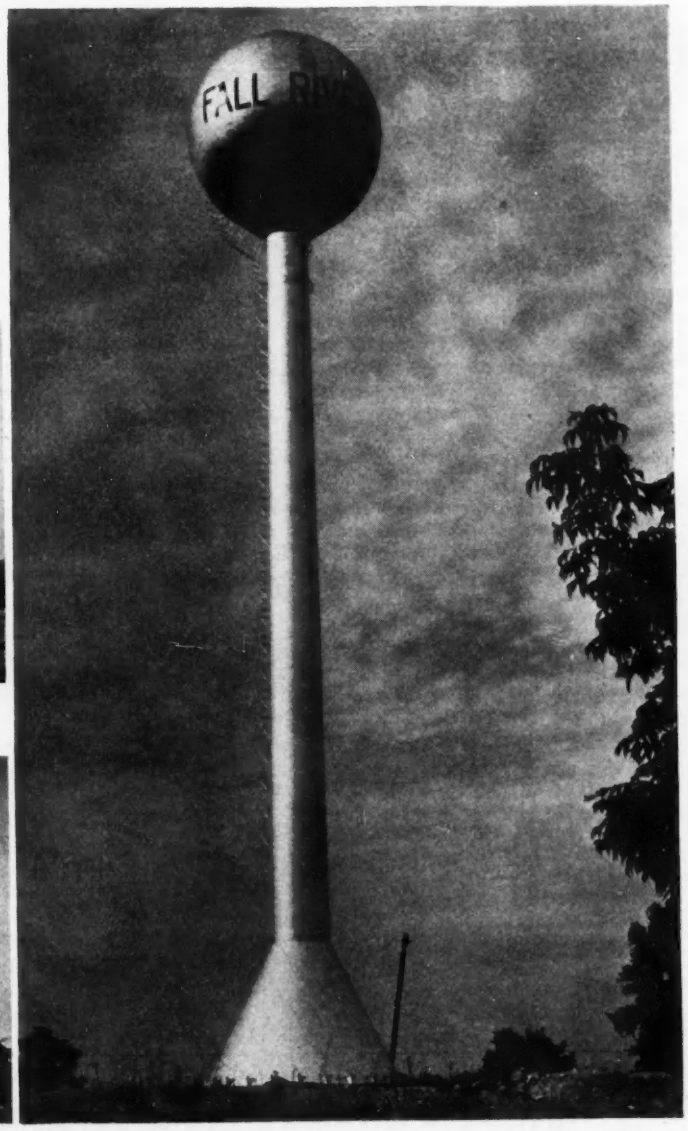
Putting a tank on a pedestal



Derrick in place ready to start erection of the tank.



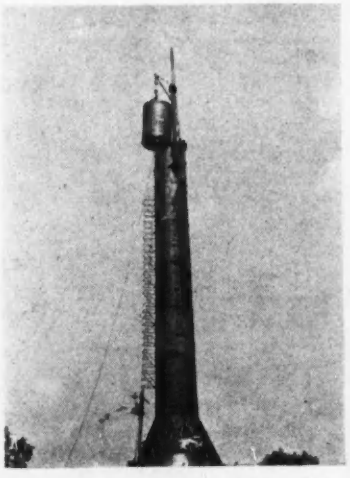
Base is constructed from cave-shaped pieces.



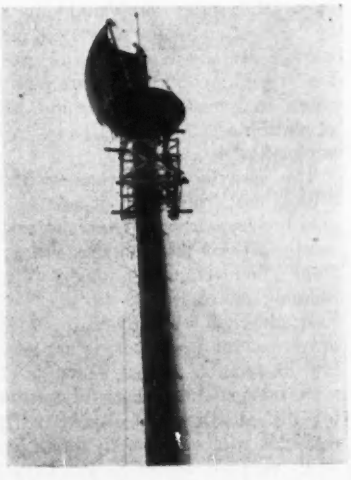
Completed tank, which provides storage for 50,000 gal. and is 110 ft. high to the bottom of the sphere.

As part of a new water supply system the town of Fall River, Wis., population 400, has built a 50,000-gal. pedestal-type "watersphere." This type of all-welded structure for water storage has developed wide popularity since its introduction in 1940, there being at present more than 20 installations in the United States.

Field erection methods used on the 110-ft. high Fall River tank are shown by the accompanying photograph. A new type of derrick, which required no guy lines outside the structure, was used. The tank was fabricated and erected by the Chicago Bridge and Iron Co. Engineers on the project were Vernon S. Hamel and H. V. Tenant of the General Engineering Co., Portage, Wis.



One of the tower rings is hoisted into position.



Shell plates welded into four sections are raised one section at a time.

WASHINGTON HIGHLIGHTS

THE U. S. HOUSING AUTHORITY is temporarily headed by deputy administrator Leon Keyserling, pending final action on the resignation of Nathan Straus.

THE PRESIDENT has asked Congress to confer on the Secretary of War the right to approve construction of bridges over navigable waters. At present each such project must be approved by an act of Congress.

INCREASING WARTIME RESTRICTIONS on information as to how military appropriations are being spent is evidenced in a bill favorably reported this week by the House naval affairs committee. The bill authorizes appropriation of $450,000,000 for public works of the Navy's Bureau of Yards and Docks. In the past, such bills have carefully specified the projects on which money is to be spent. The present bill, however, merely specifies that the Secretary of the Navy submit by Jan. 10, 1943 a report on how he used the money. This is the practice which will be followed in future.

• • •

Oklahoma cantonment sets bid record in State

The largest competitively-awarded construction contract ever to be let in Oklahoma is indicated in the language of the advance notice to bidders on the U. S. army cantonment to be built in the Cookson Hills at Braggs, Okla., 20 miles southeast of Muskogee.

While the U. S. Engineer's Tulsa office gave no estimate on the amount involved, unofficially it was estimated to be in the neighborhood of $23,000,000. The $9,333,000 contract for construction of Grand River Dam previously held the all-time high record in Oklahoma.

The call for bids was scheduled to be issued Jan. 19, and involved in the contract is construction of a total of 1,731 buildings.

The contractor also will construct the following facilities: water supply from Greenleaf Lake to and including a 3,000,000 gallon concrete water storage reservoir adjacent to the cantonment; a water distribution system; sanitary sewers, gas distribution system, electrical distribution system, and roads, grading and drainage.

Speedy construction indicated

Stricter army regulations on contractors are evident from provisions included that "certain portions of the work will be required by June 1, and completion of the entire project will be required by July 15, 1942."

The advance notice also states: "The contractor will be required to prosecute the work 24 hours a day, 7 days a week, when, in the opinion of the contracting officer, such action is necessary in order to complete the work on schedule. Delays to scheduled progress of the contract work, which may be caused by unfavorable weather conditions or by labor difficulties, will be required to be offset by the addition of sufficient plant and labor to enable the work to be completed within the contract period."

Deferments temporary says General Hershey

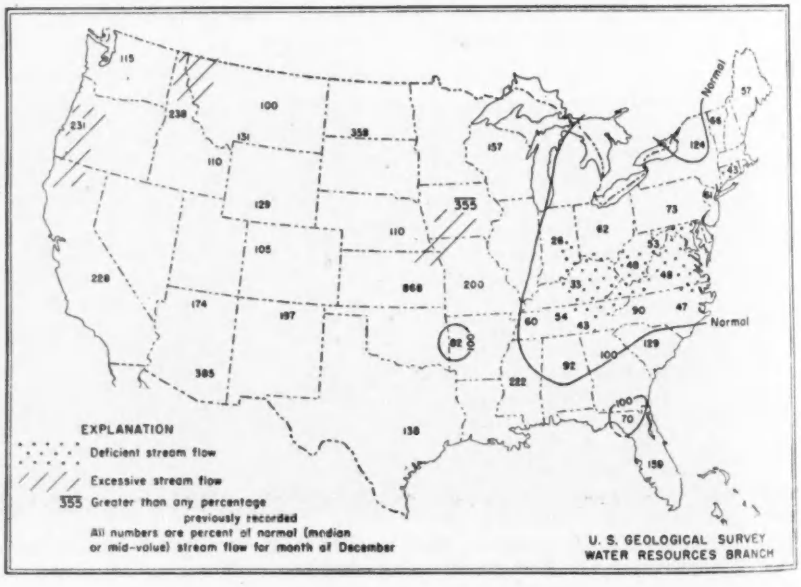
Although men will continue to be deferred from military service when they have dependents or when they are "necessary men," who are difficult or impossible to replace, such deferments are only temporary, Brig. Gen. Lewis B. Hershey, director of Selective Service, said last week. In an interview with a representative of *Engineering News-Record*, General Hershey warned, however, that "Each employer has the responsibility to secure and train replacements for such deferred men who are physically fit and would otherwise be available for military service. Occupational deferments are usually for a 6-month period. When absolutely necessary, such deferment may be continued for additional 6-month periods, but only where their continuance in the present job is absolutely necessary for the maintenance of our national health, safety and interest." General Hershey pointed out that there is an adequate supply of replacements for necessary men among those who are physically unfit for military service, those who are presently deferred because they have dependents, those between the ages of 45 to 65, and in many cases among the women of the country.

"Employers must be honest and sincere," said General Hershey, "in their requests for deferments, and must limit such requests to cases of men who are in fact necessary. No industry or activity, no matter how closely identified with national production for war, can ever become a refuge for those who seek to avoid their obligation to their country in its hour of need."

Stream-flow increases in East as Central West continues wet in December

The trend of stream-flow for December was decidedly favorable for national economy. More water was available for power in the East and some water was put into storage. In the West, storage prospects for irrigation continue to look very favorable. In general, the drought area is diminishing and the area of excess stream-flow is increasing.

The area in which water shortage is critical has shrunk until it now embraces only the Appalachian Highland area and some parts of the Atlantic costal area, from Connecticut through Virginia. Stream-flow elsewhere in most of the East, although still only 50 to 70 percent of normal for December, is not critically low in relation to the demands. However, the general pattern of stream-flow for the month of December still corresponds with the pattern which has existed every month for the last 13 months, wet in the West and Middle West, and dry in the East.


Normal
Normal
EXPLANATION
Deficient stream flow
Excessive stream flow
355 Greater than any percentage previously recorded
All numbers are percent of normal (median or mid-value) stream flow for month of December
U. S. GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

OBITUARY

WILLIAM F. MERCER, 68, civil engineer, employed by the New York City Department of Public Works in the borough of Manhattan, died Jan. 18 at Scarsdale, N. Y.

J. CLIFFORD MCGAREY, 71, who for ten years prior to his retirement, was an engineer in the Ohio State Highway Department, died at Columbus, Ohio, Jan. 17.

THOMAS F. MCCAULEY, 69, Cedar Rapids city engineer and former employee of the Iowa State Highway Commission, died Jan. 11 at Cedar Rapids, Iowa.

THOMAS F. LININGER, engineer for the Ohio Department of Highways, and city engineer of Conneaut, Ohio, from 1932 to 1939, died Jan. 10 in Conneaut.

WILLIAM R. KIRBY, 63, civil engineer formerly of Little Rock, Ark., died Jan. 12 in Chicago, Ill. He was active in the construction of Camp Pike, now Camp Robinson, near Little Rock, during World War I.

EDWIN F. HARPER, 75, chief engineer for the East Side Levee and Sanitary District of Madison and St. Clair counties, Ill., for the past 17 years, died Jan. 13 at E. St. Louis, Ill. He was city engineer for East St. Louis from 1911 to 1922, later becoming consulting engineer for the levee district and in 1925 was made its chief engineer.

JOHN D. BABY, 53, well-known civil engineer of Beardmore, Ont., died Jan. 12 at Hamilton, Ont. For several years he was connected with the Ontario Department of Highways and prior to that connection had held posts in Western Canada, and China, and had helped to build the Canton-Hong Kong Railway.

C. MORTON AYRES, SR., 72, civil engineer, died Jan. 13 at Tuscaloosa, Ala. For 23 years he served the Central Coal & Iron Co. as chief engineer.

PETER KENDRICK, president of Peter Kendrick Engineering Co., died recently at St. Augustine, Fla.

WALES LINES DEBUSSY, vice president of the H. Wales Lines Co., general contractors, Meriden, Conn., died Jan. 11 at Meriden. He was 50 years old.

JOHN A. VOGELSON, 70, former chief of the Municipal Bureaus of Engineering, Water, Health and Surveys, Philadelphia, Pa., died Jan. 17 at Philadelphia. In 1905 he was an assistant engineer in the Department of Sewer and Waterworks Construction, and later became assistant engineer in the Department of Water Supply, Gas and Electricity in New York City. He returned to Philadelphia as a field engineer in the Bureau of Water.

HERBERT L. WILLIAMS, 40, senior engineer with the New Orleans District of the U. S. Engineers Office, died Jan. 10 at New Orleans. He was a graduate of the Engineering School of Purdue University, 1924.

LT. COL. FRANK B. MALTBY, civil engineer, died recently at his home in Denver, Colo. He was commissioned as an engineer officer during World War I, and served as section engineer at St. Nazaire, France. He was awarded the Legion of Honor from the French government. For many years he was in charge of maintaining the channel on the Mississippi River under the Mississippi River Commission and the War Department. Colonel Maltby served as principal assistant in charge of dredging during construction of the Panama Canal, and executed many important engineering assignments in connection with the construction of locks and dams for Day & Zimmerman Engineering Co. He was later engaged in engineering and consulting work on the construction of the Cape Cod canal and the development of many harbors in the United States and abroad. He was a graduate of the University of Illinois.

CONTRACTS AND CAPITAL

ENGINEERING CONSTRUCTION awards for the week, $127,640,000, are 53 percent higher than for last week, but are 18 percent lower than in the corresponding 1941 week. Federal awards, which make up 86 percent of this week's volume, are 93 percent higher than a week ago, and are responsible for the increase. They top the 1941 week by 7 percent.

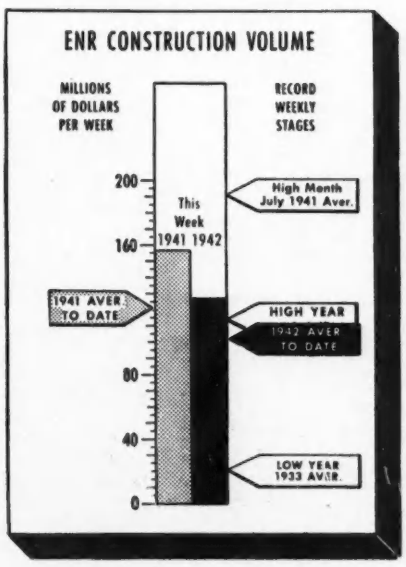
Public construction is 69 percent above last week, but 1½ percent under the week last year. Private awards are 45 and 81 percent lower, respectively, than a week ago and a year ago.

The current week's volume brings 1942 construction to $407,086,000, a decrease of 16 percent from the four-week total last year. Private awards, $33,965,000, are 75 percent below the period a year ago. Public construction, $373,121,000, exceeds last year's mark by 7 percent as a result of the 25 percent increase in federal work. State and municipal awards are 38 percent lower than in the 1941 period.

In the classified construction groups, gains over last week are in public buildings, earthwork and drainage, and unclassified construction. Earthwork and drainage is the only class of work to report an increase over the 1941 week.

New capital for construction purposes for the week totals $25,741,000, a decrease of 19 percent from the corresponding 1941 week's volume. The week's new financing is made up of $20,274,000 in corporate security issues, $4,467,000 in state and municipal bond sales, and $1,000,000 in RFC loans for public improvements.

New construction financing for the year to date, $504,433,000, is 514 percent above the $82,139,000 reported for the four-week period last year.



CONTRACTS

(Thousands of dollars)

	Week Ending Jan. 23 1941	Jan. 15 1942	Jan.22 1942
Federal	$102,409	$56,909	$109,717
State & Municipal	20,645	14,827	11,599
Total public	$123,054	$71,736	$121,316
Total private	33,120	11,526	6,324
TOTALS	$156,174	$83,262	$127,640
Cumulative 1942	(4 weeks)		$407,086
1941	(4 weeks)		$485,715

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1941 4 weeks	1942 4 weeks
NON-FEDERAL	$82,139	$54,433
Corp. Securities	25,054	22,074
State & Mun	43,422	21,059
U.S.H.A. loans	12,043	.....
R.F.C. loans	1,620	11,300
FEDERAL	.....	$450,000
TOTAL CAPITAL	$82,139	$504,433

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	Jan. '42	267.63	128.65
Building Cost	Jan. '42	217.12	117.37
Volume	Dec. '41	217	95

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

BERLIN DAM, OHIO

OWNER: U. S. Engineer Office, Pittsburgh, Pa. Lt. Col. D. Lee Hooper, District Engineer.

PROJECT: Construction of Berlin Dam, a concrete and earth structure, and appurtenant work in Mahoning and Portage Counties, Ohio, on the Mahoning River. Site of work is approximately 1½ miles below bridge on U. S. Route 224, between Berlin Center and Deerfield, Ohio. Involves the following major features: clearing, grubbing and stripping; cofferdams; excavation; concrete; construction of embankments; and installation of equipment.

CONDITIONS: Government to furnish embedded metal for crest gates, stop log recess rails, supporting beams for hoisting machines, service water supply pump and tank, sump pumps, and fuel tanks for diesel-electric stand-by unit. Contractor to install this material. The contractor is responsible for transporting and storing diesel-electric stand-by unit, air compressor unit, and heater elements for seal channels, but not for the installation of these items. Rail and highway transportation facilities available. Project to be completed in 360 calendar days. Wage rates are: skilled labor, $1.25 to $1.75 per hr.; semi-skilled, 55c. to $1.45; and common labor, 75c.

BIDS: Eleven bids were opened December 22, 1941, ranging from the contract low of $1,077,112 to $2,175,880. Engineer's estimate, $1,121,151.

LIST OF BIDDERS:

1. E. J. Albrecht Co., Chicago, Ill. (contract) $1,077,112
2. Hunkin-Conkey Constr. Co., Cleveland, Ohio 1,249,923
3. The Hinman Bros. Constr. Co., Pittsburgh, Pa., and Denver, Colo. 1,451,201
4. George M. Brewster & Son, Inc., Bogota, N. J. 1,451,654
5. C. E. Knowles Co., Inc., Gowanda, N. Y. 1,494,914
6. Clevorock, Inc., New York, N. Y. 1,553,668
7. John F. Casey Co., Pittsburgh, Pa. 1,577,118
8. Badgett Constr. Co., Memphis, Tenn. 1,775,116
9. H. F. McLean, Inc., White Plains, N. Y. 1,807,898
10. Horvitz Co., Cleveland, Ohio 1,818,091
11. Great Lakes Dredge and Dock Co., Chicago, Ill. 2,175,880

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Cofferdams	L. S.	$25,000.00	$50,220.00	$106,400.00
2. Clearing and grubbing	L. S.	21,000.00	9,654.00	40,000.00
3. Common excavation	51,000 c. y.	1.00	.49	1.10
4. Common excav., borrow area	222,000 c. y.	.50	.20	.55
5. Rock excavation	41,000 c. y.	2.00	1.64	2.50
6. Rock excav., borrow area	3,000 c. y.	2.00	1.08	1.00
7. Special rock excavation	6,000 c. y.	7.00	7.63	9.00
8. Line drilling	9,000 s. f.	1.00	.80	1.00
9. Rock treatment (one coat)	100 sq.	5.00	.98	10.00
10. Random fill	219,000 c. y.	.10	.06	.15
11. Uncompacted fill	4,000 c. y.	.08	.25	.50
12. Selected pervious fill	75,000 c. y.	.10	.19	.15
13. Dumped rock	15,000 c. y.	1.35	.60	.30
14. Rock fill (hand placed)	300 c. y.	5.00	8.40	2.00
15. Percussion drill 3-in. holes (rock)	7,500 l. f.	1.00	.60	1.40
16. Drill 6-in. core holes	60 l. f.	10.00	140.00	10.00
17. Furnishing cement	60,000 bbl.	2.00	2.80	2.30
18. Reinforcing steel	250,000 lb.	.045	.08	.06
19. Class A concrete	1,000 c. y.	26.00	52.20	50.00
20. Class B concrete	28,000 c. y.	8.20	10.96	11.00
21. Class C concrete	29,000 c. y.	8.20	10.96	11.00
22. Haul, store and install equipt. furnished by government	2,500 lb.	.08	.07	.20
23. Haul and store equipt. furnished by by government	12,000 lb.	.02	.02	.10
24. Inst. struct. steel furnished by govt.	55,600 lb.	.01	.09	.06
25. Furn. and inst. structural steel	9,400 lb.	.10	.16	.20
26. Furn. and inst. misc. metal work	24,000 lb.	.15	.28	.20
27. Furn. and inst. ornament. metal work	L. S.	2,060.00	2,079.00	3,000.00
28. Plumbing system	L. S.	1,400.00	766.00	1,500.00
29. Air bubbler, fuel oil and grease piping	L. S.	1,100.00	1,183.00	1,000.00
30. Black steel pipe	15,000 lb.	.15	.27	.20
31. 36-in. sluice gates	3 ea.	1,800.00	2,710.00	2,000.00
32. Cast iron pipe	29,000 lb.	.06	.12	.20
33. Iron castings	9,600 lb.	.20	.22	.20
34. Misc. brass and bronze fittings	150 lb.	1.00	2.13	1.50
35. Rail and accessories	42,000 lb.	.05	.16	.08
36. Timber water stops	1,100 l. f.	.36	.45	.30
37. Conduits for electric wiring	L. S.	2,000.00	3,013.00	3,000.00
38. Power and lighting system	L. S.	7,000.00	10,430.00	10,000.00
39. Welding (struct. steel rod)	100 c. in.	1.00	9.80	1.00
40. Road surfacing	6,000 s. y.	1.20	2.18	1.60
41. Highway guard fence	4,300 l. f.	1.00	1.54	.90
42. Timber	1,400 bd. ft.	.10	.17	.15
43. Additional tractor compaction	100 hr.	6.00	9.80	6.00

HIGHWAY AND BRIDGE COLORADO

OWNER: Colorado State Highway Department, Denver. C. D. Vail, engineer.

PROJECT: Improvement of highway between Brush and Sterling, Logan and Washington Counties, Colorado. Includes 0.409 miles of highway, two bridge structures, and gravel approaches. One bridge of concrete and I-beam steel construction, one span 60-ft. in length, 12-ft. clearance above stream bed; other involves concrete box culvert widening, 13-ft. on each side of existing structure. Skew culvert 46-ft. long.

CONDITIONS: Contractor to furnish all materials and complete work in 400 calendar days. Rail and highway transportation facilities available. Minimum wage rates are: skilled labor, $1.10 per hr.; semi-skilled, 70c.; and common, 50c. Project has no priority rating, and some difficulty may be expected in procuring needed structural and reinforcing steel.

BIDS: Six bids were opened November 6, 1941, ranging from the contract low of $28,507 to $30,825. Engineer's estimate, $25,199.

LIST OF BIDDERS:

1. Lawrence Constr. Co., Denver, Colo. (contract) $28,507
2. Colorado Bridge and Constr. Co., Denver, Colo. 29,422
3. Frank M. Kenney, Denver, Colo. 30,282
4. Steinwald & Watts, Denver, Colo. 30,492
5. Henry Shore, Littleton, Colo. 30,573
6. J. H. & N. M. Monaghan, Denver, Colo. 30,825

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Remove bridge, Sta. 825	L. S.	$450.00	$500.00	$350.00
2. Remove two structures	L. S.	50.00	15.00	20.00
3. Remove structure, Sta. 834	L. S.	150.00	100.00	50.00
4. Remove, prepare bridge, Sta. 834	L. S.	350.00	150.00	500.00
5. Remove concrete pavement	200 s. y.	1.00	.50	.50
6. Remove detour bridge	L. S.	200.00	100.00	150.00
7. Remove, rebuild fence	4,300 l. f.	.10	.05	.08
8. Line posts, metal	140 ea.	1.00	1.00	1.25
9. Unclassified excavation	5,000 c. y.	.40	.33	.50
10. Unclassified ditch excavation	300 c. y.	.50	.60	.50
11. Dry common excavation, structures	135 c. y.	1.25	1.20	1.20
12. Wet common excavation, structures	125 c. y.	5.00	4.00	2.00
13. Mechanical tamping	52 hr.	3.00	4.00	5.00
14. Rolling fills	65 hr.	4.00	7.00	3.00
15. Furnish roller unit	2 ea.	100.00	250.00	100.00
16. Wetting fills	79 M gal.	1.75	4.00	3.00
17. Overhaul	48,000 sta. y.	.02	.02	.01
18. Overhaul	800 y. mi.	.20	.20	.06
19. Sand cushion	10 c.y.	1.00	2.00	2.00
20. Gravel surfacing	1,020 ton	1.00	1.00	1.50
21. Gravel stockpile	380 ton	1.00	.70	1.30
22. Gravel overhaul	1,000 ton mi.	.10	.07	.08
23. Untreated bridge timber	11.5 M bm.	100.00	100.00	120.00
24. Class A concrete	271 c. y.	25.00	26.50	28.00
25. Class B concrete	3 c. y.	25.00	26.50	28.00
26. Class A conc. handrail	7 c. y.	50.00	60.00	50.00
27. Reinforcing steel	29,200 lb.	.08	.08	.075
28. Structural steel	59,900 lb.	.08	.08	.09
29. 18-in. corr. metal pipe culv	56 l. f.	1.75	2.00	2.00
30. 36-in. corr. metal pipe culv	35 l. f.	5.00	6.00	4.50
31. Treated timber piling	480 l. f.	1.50	1.50	1.30
32. Untreated timber piling	440 l. f.	1.30	1.40	1.20
33. Precast concrete piling	420 l. f.	6.00	7.50	8.50
34. Riprap	80 c. y.	4.00	6.00	3.50
35. Barb wire gates	2 ea.	10.00	10.00	10.00
36. Project marker	2 ea.	25.00	25.00	25.00
37. Right-of-way marker	11 ea.	5.00	5.00	5.00
38. Drain pipe, 4-in. by 5-ft	4 ea.	7.00	8.00	6.00
39. Timber guard post	77 ea.	2.25	3.00	3.00

Engineering
Library

.20
.20
1.50
.08
.30
3,000.00
10,000.00
1.00
1.60
.80
.15
6.00

, Denver.

Brush and
. Includes
nd gravel
l construc-
ve stream
13-ft. on
long.
and com-
ransporta-
: skilled
mon, 50c.
nay be ex-
cing steel.
ging from
estimate,

	$28,507
	29,422
	30,282
	30,492
	30,573
	30,825

uces

(2)	(3)
0.00	$250.00
5.00	20.00
0.00	50.00
0.00	500.00
.50	.50
0.00	150.00
.05	.08
1.00	1.25
.33	.50
.60	.50
1.20	1.20
4.00	2.00
1.00	5.00
7.00	3.00
0.00	100.00
4.00	3.00
.02	.01
.20	.08
2.00	2.00
1.00	1.50
.70	1.30
.07	.08
0.00	120.00
6.50	26.00
6.50	26.00
0.00	50.00
.08	.075
.08	.09
2.00	2.00
6.00	4.50
1.50	1.30
1.40	1.20
7.50	8.50
3.00	3.50
0.00	10.00
5.00	25.00
5.00	5.00
8.00	6.00
3.00	3.00

ECORD